

# Foundations 2: Multinomial-Processing-Tree Modeling

## Basic Methods and Recent Advances

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### Workshop Day 1: Essentials of MPT Modeling (Thursday, 25.06.2020, 13:00-17:00)

Slides with audio explanations (please study before the Interactive Online Session!):

- **Basics** (Instructor: EE)
  - Introduction to standard MPT models (logic, examples, advantages, limitations)
  - Model development (model construction, paradigm, data structure, identifiability)
  - Parameter estimation (maximum likelihood, minimum  $\chi^2$ , power-divergence statistics)
  - Model assessment ( $G^2$ , Pearson's  $\chi^2$ , and the  $PD^\lambda$  family of goodness-of-fit statistics)
- **Application I** (Instructor: EE)
  - Introduction to multiTree: EQN syntax, data files, batch analysis
  - Practical exercises: Demonstrations using the Paired-Clustering Model
  - Order constraints: Demonstrations using the Paired-Clustering Model

#### Interactive Online Session:

- 13:00 – 14:00 **Questions** & clarifications of practical exercises
- 14:00 – 15:00 **Advanced features of multiTree** (Instructor: EE)
  - Identifiability concepts and checks provided by multiTree
  - A priori and post hoc statistical power analyses
  - Model selection (AIC, BIC, NML, and FIA criterion)
- 15:00 – 17:00 **Application II** (Instructor: EE & DH)
  - Workflow with multiTree: Developing and testing a new MPT model
  - Using advanced features in multiTree
  - Optional: Testing interactions (EE)

### Workshop Day 2: Advances in MPT Modeling (Friday, 26.06.2020, 13:00-17:00)

Slides with audio explanations (please study before the Interactive Online Session!):

- **Bayesian hierarchical MPT modeling** (Instructor: DH)
  - MPT models & heterogeneity
  - Hierarchical MPT models
  - Bayesian estimation with MCMC sampling
  - Adding continuous covariates
- **Modeling continuous data using mixture models** (Instructor: DH)
  - Modeling response times with histograms (MPT-RT)
  - Parametric modeling with generalized processing trees (GPT)
  - Serial process model for response times (RT-MPT)

Interactive Online Session:

- 13:00 – 14:00 Questions & clarifications
- 14:00 – 16:00 Application III (Instructor: DH)
  - Practical exercises on hierarchical MPT modeling using TreeBUGS
  - Basics: Model fitting, convergence, plots, model fit
  - Advanced: Within-/between-subject comparisons, covariates, simulation
- 16:00 - 17:00 Application IV (Instructors: DH & EE)
  - Questions and answers
  - Developing and testing (new) models suggested by the participants